of Unio and Sphærium, both in Munipur and in Assam, and of the distribution of many other genera and species, including Austenia.

The volume adds very little to our previous knowledge of the land operculates of India. An opportunity has been lost of bringing that knowledge up to date. The money spent on it might have had a better result. There is an absence of editorial supervision. Mr. Guy A. K. Marshall is not mentioned in the preface; all seemingly devolved on Mr. G. K. Gude. It is purely conchological and was brought out in a hurry. It should not, in fact, have been commenced until it was first ascertained who were to be engaged upon it and what collections were available. This is most important to those who, at great expense of time and toil, collect material and desire to see it in the hands of the best malacologists and so far have a voice in the publication.

Next we have to consider the best place of publication, whether in this country or in India. I lean to the latter, for in India the animals of many genera could be collected in a few weeks as required and worked out by the staff of the Indian Museum, who are quite capable of doing so. I also consider it essential to accuracy in a record of this kind that the type shell of all species should be compared so far as possible to verify the "original descriptions" in the pages and pages of "copy" which fill the volume. This applies also to the figures given of species in the Natural History Museum and other collections. They are not typical; some have no history, and are not in all cases correctly identified.

The history of the Indian operculate land shells has yet to be compiled and a more scientific classification built up. For this reason I am disappointed with this volume of "The Fauna of British India," and imagine that among other zoologists there will be a similar feeling.

In the volume there is a mass of useful compilation, particularly in the synonymy, as well as in the bringing together of the many species in the four families treated of. This work, looked at from the purely conchological side, cannot fail to be useful to collectors.

H. H. GODWIN-AUSTEN.

Chemistry of Anthracene.

Anthracene and Anthraquinone. By E. de B. Barnett. Pp. xi+436. (London: Baillière, Tindall, and Cox, 1921.) *27s. 6d.*

THE history of anthracene is long and vivid. Discovered amongst the products of coal-tar distillation in 1832, the hydrocarbon played a modest and somewhat commonplace part in the development of structural theory, suddenly blossoming into prominence in 1868, when it was found that alizarin, the twin monarch with indigo of natural colouring matters, is a dihydroxyanthraquinone. The persistent and active investigation of anthracene derivatives consequent on this revelation had scarcely slackened in 1901, when Bohn discovered the remarkable condensation undergone by β-aminoanthraquinone, leading to indanthrene and flavanthrene, vat-dyes superior in fastness to indigo itself. During the subsequent period notable additions to the series have been made in the direction of complex benzanthrones—for example, violanthrene, a non-nitrogenous vat-dye represented as an oxygenated agglomeration of nine benzenoid nuclei. Thus anthracene, now approaching its centenary still provides abundant material for scientific investigation and practical application.

It is, therefore, most appropriate that so much information, extending over so many years, should be assembled in a form convenient for reference, and the volume which Mr. Barnett has produced will be found extremely valuable by all chemists who desire to be advised of the latest discoveries in this important field. Beginning with a comprehensive survey of the early work and the substituted derivatives of anthracene itself, the author passes to anthraquinone, anthrone, and anthranol. Treatment of the numerous hydroxyanthraquinones has been limited to the ground which is not covered by A. G. Perkin and Everest in their recent book on "The Natural Organic Colouring Matters," and thus it has been possible to devote almost half the text to aminoanthraquinones and the highly important modern discoveries to which reference has been made. It is this feature which will be most appreciated by chemists because, owing to the recent developments of anthracene chemistry having taken place principally in the German dye-factories, the relevant information is largely scattered through the patent literature, and is consequently not easy of access.

Some idea of the faithful industry which the author has brought to his task may be gained from the statement that the index to German patents so liberally quoted throughout the volume alone occupies eighteen pages, and refers to more than one thousand items, which are assembled in sequence, with the respective date and name of patentee. Constant attention is directed to those colouring matters which arise from the various classes of anthracene derivatives, thus adding to the general usefulness of the book a quality speci-

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ally attractive to chemists concerned with the application and manufacture of dyes.

Praise is due also for the general index, and, excepting a few lapses into laboratory slang and the "of course" habit, the literary form is commendable. In the second edition, however, it is to be hoped that the author will establish uniformity of construction in the compound words; to find "octa-chlor anthracene" in one line, and "tetrachloranthraquinone" in the next, is exasperating to a methodical reader, and a bad example to students. This fault is persisted in throughout, and is the only blemish in an otherwise admirable treatise. M. O. FORSTER.

The Future of Geometrical Optics.

(1) *Geometrical Investigation of the Formation of Images in Optical Instruments, embodying the Results of Scientific Researches conducted in German Optical Workshops.* Edited by M. von Rohr. (Forming vol. 1 of "The Theory of Optical Instruments.") Translated by R. Kanthack. Pp. xxiii+612. Printed and published for the Department of Scientific and Industrial Research by H.M. Stationery Office, 1920. (From any bookseller or through H.M.S.O. at Imperial House, Kingsway, W.C.2, and 28 Abingdon Street, S.W.1; 37 Peter Street, Manchester; 1 St. Andrew's Crescent, Cardiff; 23 Forth Street, Edinburgh; or from E. Ponsonby, Ltd., 116 Grafton Street, Dublin.) 2*l.* 5*s.* net.

(2) *Die Binokularen Instrumente: Nach Quellen und bis zum Ausgang von* 1910 *Bearbeitet.* By Prof. Moritz von Rohr. Zweite, Vermehrte, und Verbesserte Auflage. (Naturwissenschaftliche Monographien und Lehrbücher. Zweiter Band.) Pp. xvii+303. (Berlin: Julius Springer, 1920.) 40 marks.

AT a meeting of the Optical Society held in Cambridge on May 21 last, the future of geometrical optics formed the subject of an interesting discussion, in which the points of view of mathematicians and practical designers respectively were expressed. The subject has regained actuality in recent years in view of the undoubted superiority in optical design possessed by the German manufacturers in 1914, a superiority which proved a serious handicap to us in the manufacture of optical instruments such as range-finders, etc., required for military and naval purposes. The importance of this branch of knowledge was then realised; unfortunately, before the war the subject had been gradually dropping out of university curricula, the laborious algebra involved and the stereotyped methods of treatment combining to render it distasteful to mathematical teachers and students. Relegated to a corner of the mathematical syllabus, geometrical optics was too often reduced to a few formulæ crammed in a hurry, and it lacked the vitalising influence of really interesting and practical illustrations. The manufacturing optical designer, on the other hand, tired of waiting for mathematical developments adequate to his needs, became increasingly empirical in his methods, and even now depends almost exclusively upon trigonometrical tracing of a few rays, which is, in fact, nothing else but trial and error. Probably this almost complete divorce between theory and practice accounts largely for the unprogressive character of pre-war British optical design as compared with the German.

(1) It is a natural inference that in some way the British type of text-book on this branch of science fails to stimulate the reader, and, bearing in mind the pioneer work of Abbe, Seidel, Steinheil, Koenig, and von Rohr in Germany, it is obviously desirable that the work of these masters of the subject should be made readily accessible to English-speaking students. The Department of Scientific and Industrial Research is therefore to be congratulated upon bringing out a translation of the classical treatise on "The Theory of Optical Instruments," edited by Moritz von Rohr. The translation has been carried out by Mr. R. Kanthack, and the work has evidently been done with great conscientiousness and accuracy. The translator acknowledges the valuable help of Messrs. J. W. French and E. B. Knobel and of Prof. J. W. Nicholson. In various respects the translation is an improvement on the original, the numbering of the paragraphs and equations greatly facilitating reference. Additions and modifications have also been made to the bibliography, and the figures have been improved and various errors corrected. The book is well got up, and altogether a very creditable production, which meets an undoubted need.

When all this has been said, however, it may be doubted whether, after all, von Rohr's treatise is really likely to stimulate the student, at any rate in this country. For one thing, it is not the work of a single mind. Chap. 1, on the fundamental principles, is by H. Siedentopf; chap. 3, on Abbe's theory of optical images, by E. Wandersleb; chap. 4, which treats of optical images from a different point of view, by P. Culmann; chap. 8, on prisms, by F. Loewe; Dr. Koenig has written chaps. 6 (on chromatic aberrations) and 7 (on the computation of optical

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